

## **A.37 Delta Mudwort (*Limosella subulata*)**

### **A.37.1 Legal Status**

Delta mudwort (*Limosella subulata*) is not listed under either federal or California Endangered Species Acts. Its Heritage Ranking in the California Natural Diversity Database is G4?Q/S2.1 which means that the species as a whole is apparently secure across its overall distribution, but some factors of concern, such as narrow habitat or continuing threats, do exist. The “?” portion of the rank indicates that there is uncertainty about the rank. The “Q” portion of the rank indicates that unresolved taxonomic questions remain for this rare species. The state level rank of distribution indicates that in the State of California, there are either between 6 to 20 viable element occurrences of this species, 1,000 to 3,000 individuals of this species, or 2,000 to 10,000 acres where this species occurs. Its state threat level rank is “very threatened.”

The California Native Plant Society (CNPS) List ranking of 2.1 for Delta mudwort indicates that it is rare, threatened, or endangered in California, but more common elsewhere. It is considered by CNPS to be seriously endangered in California with over 80 percent of occurrences threatened. Without the wider distribution outside of California, plants on CNPS List 2 would be placed on List 1B. Plants with a List rank of 1B are considered by the California Native Plant Society to meet the definitions of Section 1901, Chapter 10 (Native Plant Protection Act) or Sections 2062 and 2067 (California Endangered Species Act) of the California Fish and Game Code.

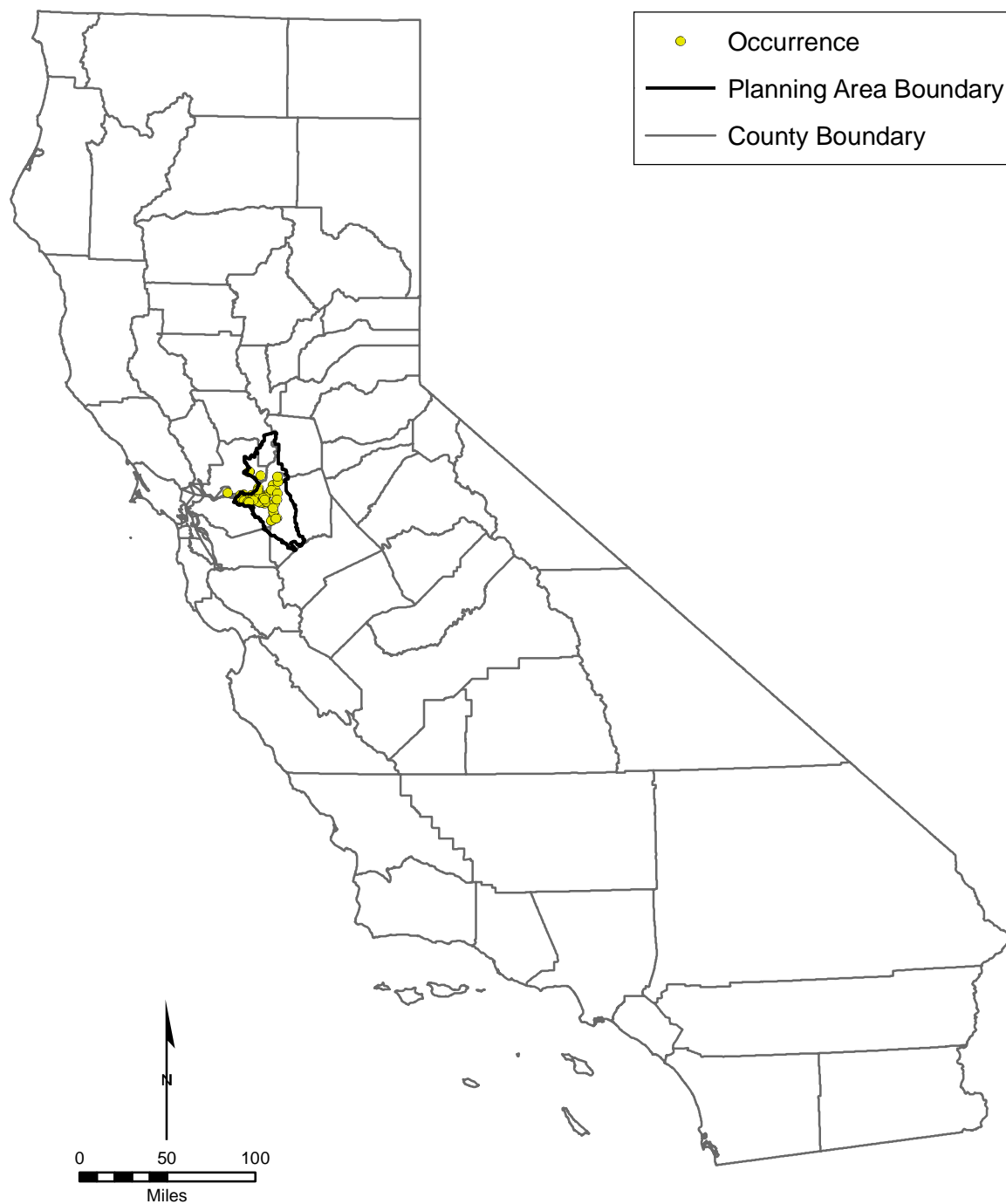
### **A.37.2 Species Distribution and Status**

#### **Range and Status**

In California, Delta mudwort is found only in the Sacramento-San Joaquin Delta region (Figure A.37.1). Its range extends from Solano County in the north, San Joaquin County in the south, Contra Costa County in the west, and Sacramento County in the east. Outside of California, it can be found in British Columbia, on the east coast of North America, and in Europe (Hickman 1993). On the east coast of the United States, it is threatened by habitat destruction (CNPS 2008).

#### **Distribution and Status in the Planning Area**

Within the BDCP Planning Area, Delta mudwort occurs in the tidal zones of marshes, rivers, and creeks, predominantly in the central area of the legal Delta (Figure A.37.2). It has been observed within the tidal zone along Calhoun Cut and Barker Slough (Witham and Kareofelas 1994), in the Miner Slough Wildlife Area, along Montezuma Slough, near Three Mile Slough, at Brown’s Island, and near Collinsville among other locations throughout the Delta (CNDDDB 2008). It is found in brackish and freshwater tidal marsh plant communities along with Mason’s lilaeopsis (*Lilaeopsis masonii*) (a covered species) immediately below the elevation where Delta tule pea (*Lathyrus jepsonii* var. *jepsonii*) (a covered species) and Suisun Marsh aster (*Symphyotrichum lentum*) (a covered species) is commonly found (Witham and Kareofelas 1994).



Source: California Department of Fish and Game, CNDDDB, 2008.  
Daniel Burnmester, 2008.

Figure A.37.1. Delta Mudwort Statewide Recorded Occurrences

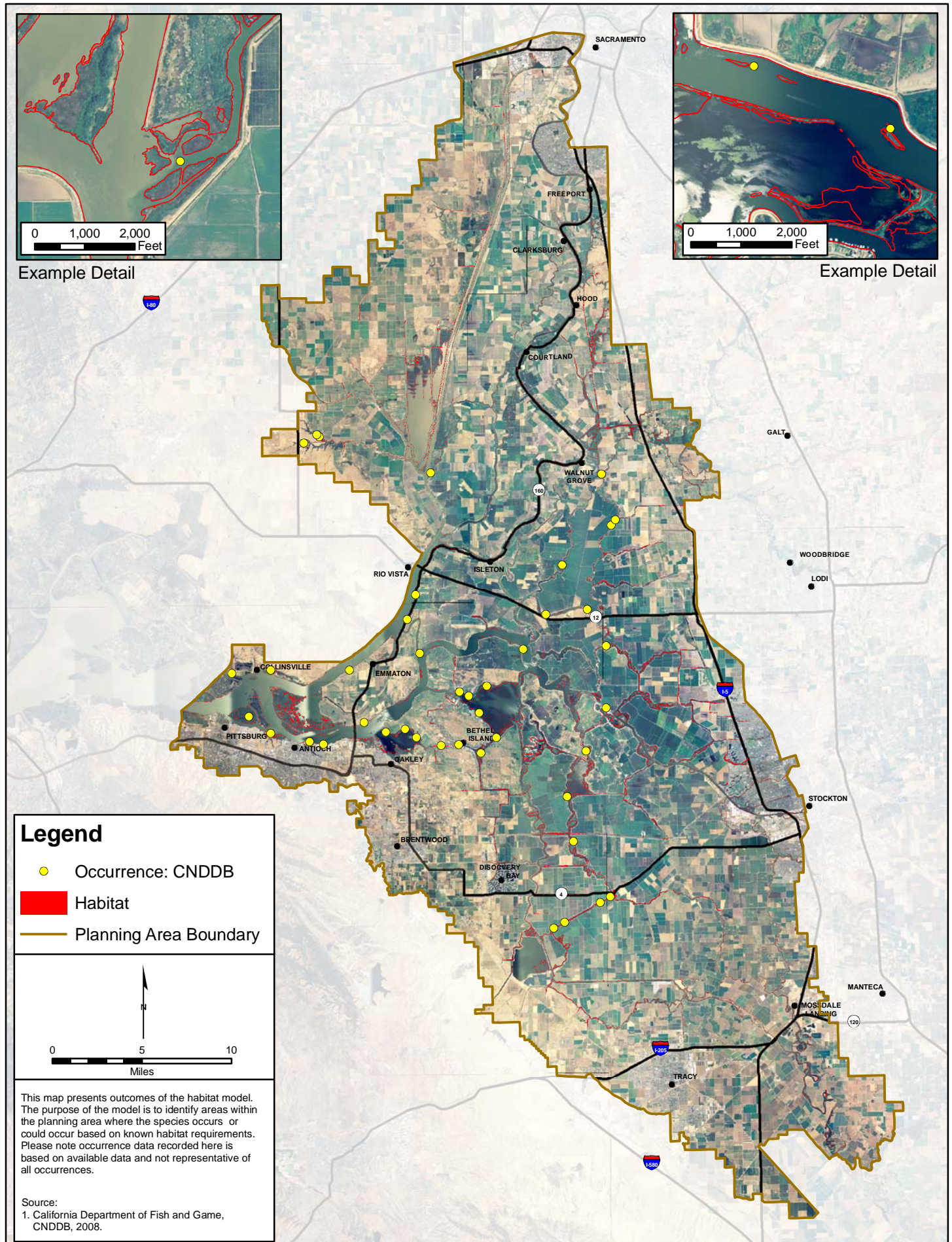


Figure A.37.2. Delta Mudwort Habitat Model and Recorded Occurrences



### A.37.3 Habitat Requirements and Special Considerations

Delta mudwort grows on intertidal flats and muddy banks of watercourses in estuarine areas, surrounded by brackish or freshwater marsh and riparian scrub communities. Occasionally it can be found along the edges of tule marshes (Witham and Kareofelas 1994). It blooms from May to August (Hickman 1993, CNPS 2008) and has been observed associated with or near other covered species Mason's lilaeopsis, Delta Tule pea, and Suisun Marsh aster (Witham and Kareofelas 1994, May & Associates 2005). Although the data are somewhat inconclusive, Delta mudwort appears to be more sensitive to salinity concentrations near or greater than 7 parts per thousand than Mason's lilaeopsis with substantially reduced flowering and seed germination rates (Golden and Fiedler 1991, Fiedler and Zebell 1993, Zebell and Fiedler 1996).

### A.37.4 Life History

Delta mudwort is a stoloniferous, aquatic, perennial herb in the snapdragon family (Scrophulariaceae). The leaves are one to three cm long and cylindrical, giving the plant a "grasslike" appearance. The stems bear solitary white to lavender-blue flowers approximately 3 mm in length (Hickman 1993). Delta mudwort strongly resembles Mason's lilaeopsis (*Lilaeopsis masonii*) when vegetative (before flowering and fruiting). The bell-shaped flowers of Delta mudwort make it easy to distinguish when in bloom. When not blooming, Mason's lilaeopsis can be distinguished by partitions in its cylindrical leaves; while Delta mudwort lacks this feature (Witham and Kareofelas 1994). The California Department of Fish and Game considers the Delta mudwort to be native to California (R. Bittman pers. comm.), while The Jepson Manual (Hickman 1993) identifies the species as not native to California.

### A.37.5 Threats and Stressors

Delta mudwort is threatened by habitat destruction, including alteration of hydrology and recreational activities such as boating, which creates wakes that erode banks and shorelines. Fishing and hunting access also pose a threat to this species (Witham and Kareofelas 1994). Petroleum product spills could have a significant impact on tidal flat biota, and non-biodegradable litter such as plastics could collect near the tidal drift line, inhibiting plant establishment and growth (Witham and Kareofelas 1994).

### A.37.6 Relevant Conservation Efforts

Populations are preserved on the DFG Calhoun Cut Ecological Preserve and in the Miner Slough Wildlife Area (CNDDDB 2008).

The CALFED Bay-Delta Ecosystem Restoration Program Plan's Multi-Species Conservation Strategy designates the Delta mudwort as "Contribute to Recovery" (CALFED Bay-Delta Program 2000). This means that CALFED will undertake actions under its control and within its scope that are necessary to recover the species. Recovery is equivalent to the requirements of delisting a species under federal and State ESAs.

### A.37.7 Species Habitat Suitability Model

**Habitat.** Vegetation types designated as species habitat in this model correspond to the mapped vegetation associations in the BDCP GIS vegetation data layer. For this species, the golf course, artificial lake, and boat docks of Discovery Bay represented a significant misclassification of land cover by DFG and were deleted from the GIS vegetation data layer. Delta mudwort habitat

is identified as all areas within 10 feet on either side of the landward boundary of Tidal Perennial Aquatic land cover type.

**Assumptions.** Historical and current records of this species indicate that its distribution extends almost throughout the BDCP Planning Area having been observed in tidally influenced waters from Liberty Island southward and from the area of the Clifton Court Forebay northwards (Figure A.37.2) (Fiedler and Zebell 1993, Witham and Kareofelas 1994, Zebell and Fiedler 1996, CNDDDB 2008). While there are no occurrences within the BDCP Planning Area north of Liberty Island or significantly south of the Old River channel near the Clifton Court Forebay, patches of suitable habitat extend beyond those areas. For purposes of this model, a 10 foot-wide buffer on each side of the landward edge of the Tidal Perennial Aquatic land cover type (20 foot combined width) is included as the potential extent of tidal mudflat habitat that supports this species. Within the BDCP Planning Area this species primary habitat is tidally inundated bare areas of clay or clay loam substrate on the outer margin of wave-cut beaches, or eroding earthen levees, or on the flats immediately below wave-cut beaches and eroding levees (Witham and Kareofelas 1994, Zebell and Fiedler 1996). This substrate defined habitat has not been separately mapped, but it generally occurs in close association with the Tidal Perennial Aquatic land cover type. Therefore, the habitat model uses the buffered landward boundary of Tidal Perennial Aquatic land cover type as a surrogate for identifying tidal mudflats that support habitat for Delta mudwort.

### A.37.8 Recovery Goals

A recovery plan has not been prepared for this species and no recovery goals have been established.

### Literature Cited

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- CNDDDB (California Natural Diversity Data Base RareFind). 2008. California Department of Fish and Game, Sacramento, CA. Ver. 3.1.0 with data generated on June 29, 2008.
- CNPS (California Native Plant Society). 2008. Inventory of Rare and Endangered Plants (online edition, v7-08c-interim). California Native Plant Society. Sacramento, CA. Accessed on September 3, 2008. Available at: <http://www.cnps.org/inventory>.
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- 1 Hickman, J.C., ed. 1993. The Jepson Manual: Higher Plants of California. University of  
2 California Press. Berkeley, California.
- 3 May & Associates. 2005. Rare plant survey Delta transmission corridor, Solano, Sacramento,  
4 and Contra Costa Counties, California. Essex Environmental, Half Moon Bay, CA
- 5 Witham, C.W., G.A. Kareofelas. 1994. Botanical Resources Inventory at Calhoun Cut  
6 Ecological Reserve Following California's Recent Drought. Sacramento: California  
7 Department of Fish and Game.
- 8 Zebell, R., P. Fiedler. 1996. Restoration and recovery of Mason's lilaeopsis: Phase II. Final  
9 report to the California Department of Fish and Game, Plant Conservation Program. 50  
10 pp.

### 11 Personal Communications

- 12 Roxanne Bittman (Senior Biologist, California Department of Fish and Game, Sacramento, CA),  
13 email to John Gerlach regarding the native status of Delta mudwort (*Limosella subulata*).  
14 September 15, 2008.